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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the computer resource utilizing method and
system which resell and provide the portion which serves as excess capacity among computer
resources especially for the others about the system containing many computers connected via
the network.
[0002]
[Description of the Prior Art]As calculation which needs a lot of machine time and computer
power. for example, various kinds of simulations (the large scale simulation which made vector
operation the subject.) To the simulation of refuge at the time of a disaster, etc. and Image
Processing Division, such as a rendering, the risk analysis which needs many case studies, the
optimization problem in which a seek area is very large and a pan. The computer aided design
(CAD;computer assited design) etc. which made full use of the finite element method, etc. are
mentioned. These calculations have been conventionally performed using high-performance-
computation machines, such as a supercomputer.
[0003]On the other hand, the improvement in the throughput in a personal computer (personal
computer) in recent years and server computer is remarkable, and can say that it has far exceeded
the supercomputer etc., considering the viewpoint of the increasing rate of the performance in the
past several years. The processor used for a personal computer or a server has also appeared on
the market in the commercial scene inexpensive and in large quantities. As a result, even if it is a
computer of a personal computer class, if a number is collected, the information processing
ability which exceeds a supercomputer as the whole will be acquired increasingly.
[0004]Then, it is single, or as one sort of the parallel computer instead of the supercomputer
using a small number of processor, the processor of a personal computer class is arranged in
large quantities, it connects mutually, and the thing which makes processing share with each
processor is proposed. Network connection of the computer of a personal computer etc. which
can be operated independent is carried out, and the distributed computer which distributes to
each computer and performs processing is also proposed. It also calls it global computing
(global-area calculation) or cluster computing to perform parallel/distribution calculation using
the computer resources (personal computer etc.) especially distributed and connected to the wide
area network.
[0005]

[Problem to be solved by the invention]Since it is restricted, the throughput which can be performed by single computer is set aside when always carrying out large-scale calculation which was mentioned above, Since the labor for carrying out control of maintenance of it is needed while purchasing an expensive computer, it will become quite expensive to prepare the computing power which can process such large-scale calculation on one's own account, when performing not so high frequency but large-scale calculation. Since it is hard to assume that the computational complexity demanded does not change in time even if it is a case where large-scale calculation is always carried out, a computer etc. will be arranged according to the amount required of a peak period, and it will become difficult to acquire after all the result in which investment is balanced.

[0006]Considering a case where Data Processing Division in a company is contracted out, under the present circumstances, only service using a limited computer which a contractor of a contract destination employs is obtained. This outsourcing service is not necessarily suitable for a use which needs count ability to a limit, and also a utilization charge of a certain period at least was being fixed, and it was difficult to grasp the validity of those courtesy rates in real time for a service user.

[0007]As mentioned above, the number of spread and throughput of a personal computer or servers tend to increase greatly, but. For example, considering a usage pattern of an office personal computer, the personal computer is not necessarily performing processing corresponding to improvement in the throughput, and a remarkable margin is increasingly produced in throughput. Although capability of those personal computers may specifically be used for a very limited peak period with all its might, almost all other time is in the state where capability of a personal computer is made to fully remain. A margin part in such throughput is usable in order to share and perform calculation by techniques, such as global computing, it is usable in order to provide for the others and to receive a remuneration of the part potentially, but. Under the present circumstances, structure for opening for use of the others does not exist as it wants, when he wants the margin part. Even if sufficient hardware to perform the calculation by global computing also for a user who performs large-scale calculation exists in a world, a mechanism of making the large-scale calculation performing using those hardwares does not exist.

[0008]Therefore, while the purpose of this invention enables it to open wide and resell the remaining power portion of the information processing ability which the computer linked to a network has to the others, It is in providing a method and a system for the user who tries to calculate to exploit a computer resource easily if needed.

[0009]
[Means for solving problem]In this invention, the method and system for buying and reselling the remaining power portion of the information processing ability which an accessible computer has to networks, such as a wide area network (WAN), are provided. Although it may set fixed about the acquisition expense of a remaining power portion, in order to give an incentive, it is better to provide the portion which interlocks and changes to the demand-and-supply balance of the both sides of the capability offer and service enjoyment side.

[0010]In this invention, those who are going to resell the remaining power in a computer resource for the others (donor) register that into the center beforehand. The registered information is accumulated in the database of a center. And a series of processings requested by the user (those who are going to enjoy service) are divided into two or more unit processings in which parallel processing is possible, and a center assigns them to the remaining power of two or

more computers by the side of a donor. It enables this to realize inexpensive and very high-speed data-processing capability. By dividing into two or more unit processings a series of processings requested by the user, and performing by two or more computers, the data security at the time of the Information Handling Service implementation to a user is raised.

[0011]When the reliability of Information Handling Service to a user needs to be improved, the same unit processing is assigned in parallel with two or more computers.

[0012]In order to enable the above processings, a software module (client software) for it is carried in each computer by the side of capability offer. As for a software module, it is preferred for extension [in / including various kinds of functions required in order to realize each service mentioned above aiming at reservation of security / a future] to be possible.

[0013]

[Mode for carrying out the invention]Next, a desirable embodiment of this invention is described with reference to Drawings. Drawing 1 is a block diagram showing an entire configuration of a computer resource utilization system of one form of enforcement of this invention. A computer resource utilization system is a network system with which a computer resource utilizing method of this invention is applied, It is a system in order to resell to a user who presupposes that he would like to buy the remaining power portion of information processing ability which an accessible computer has to this network system, and to use that remaining power portion for it. As for distribution/parallel processing, calculation which a user wants to perform is done by computer of a large number which are going to provide remaining power with the technique of global computing.

[0014]A computer resource utilization system shown in drawing 1 including the wide area network (WAN;wide area network) 1 to the wide area network 1. While the center system 2 connects, the computer 5 which the user 3 who is going to exploit a computer resource, and the donor 4 who is going to provide a remaining power portion of information processing ability hold, or has a royalty has connected. At least the one number per donor 4 of the computers 5 by which each donor 4 is going to provide remaining power may be [two or more]. On the other hand, as for the number of donor 4 the very thing, it is very desirable to make it become [two or more] from a viewpoint on security, etc. so that it may mention later. The number of the computer 5 as the whole carries out beyond [a majority of] a grade so that it can calculate effectively by global computing. Actually, when the donor 4 registers the computer 5 to hold into the center system 2 (proposal of sale of a remaining power portion of information processing ability), each computer 5 will connect with the center system 2 logically via the wide area network 1. Although it is also possible for the wide area network 1 to consider it as a network which has sufficient speed to perform global computing, and to use the Internet etc., In that case, since data is transmitted from the center system 2 side and received at any time to the donor's 4 computer 5 so that it may mention later, it is very preferred that it is always a connected type.

[0015]The center system 2 receives the proposal of sale of the remaining power portion of the information processing ability from the donor 4, Receive the computation demand from the user 3 and the computation requested by the user 3 is divided into two or more unit processings in which parallel processing is possible, Each unit processing (unit-of-account block) is distributed to each donor's 4 computer 5, processing results are collected from these computers 5, and processing which the user 3 returns a result is performed. The center system 2 performs fee collection, claim and clearing processing to the user 3, and payment processing based on the operating experience to the donor 3. In this invention, although it is possible to determine the acquisition price / selling price of the remaining power portion of information processing ability

according to the demand balance of offer (supply) of the remaining power of information processing ability and use (demand) of such remaining power, In performing price setting according to such demand-and-supply balance, the center system 2 also performs processing which computes an acquisition price / selling price and is shown to 4/of donor user 3.

[0016]Next, the flow of overall processing with this computer resource utilization system is explained using drawing 2.

[0017]The donor 4 who is going to provide self possession / surplus count ability of the computer 5 to manage requests the center system 2 to the center system 2 via the wide area network 1 first to register the donor 4 (Step 101). Here, two or more donors 4 should request donor registration. The center system 2 so that the request from each donor 4 may be received and the donor 4 can share and perform the user's 3 computation, Required setting out (donor registration) inside the center system 2, such as registering the donor 4 into the surplus throughput database mentioned later, is performed (Step 102). The center system 2 distributes client software to each donor 4 via the wide area network 1 after the end of donor registration (Step 103). The donor 4 installs the client software in the self computer 5. In order that this client software may carry out assignment execution of the computation by the technique of global computing, Connect to the center system 2, receive a unit-of-account block, and the unit-of-account block is processed, It is software for the center system 2 to return a calculation result, and is used for the contents of the user 3 who requests computation, or the actually requested computation in common not related. Namely, once it installs client software, the computer 5, (although there are restrictions on the operating system (OS) to be used and a computer architecture, of course) The arbitrary unit-of-account blocks originating in the arbitrary users 3 can be processed now. For prevention of an unauthorized use of the safety of data, and a system, for connection between the center system 2 and the donor's 4 computer 5. It is preferred to use the enciphered dedicated protocol and, as for client software, having dealt with such an enciphered dedicated protocol is preferred. Processing of the above step 101 and Step 103 can be registered into the website on the Internet, and can be performed as publicly known processing in which distribution of software is received. Of course, it is also possible to store client software in recording media, such as CD-ROM, and to distribute this CD-ROM to the donor 4 physically. In this case, client software is installed by the computer 5, when the donor 4 equips the computer 5 with that CD-ROM and executes a predetermined command. To recording media, such as CD-ROM, besides client software, The program of the online signup for donor registration is stored, this recording medium is distributed to the donor 4 in advance, and client software may be made to be installed in the computer 5 while online signup performs donor registration.

[0018]On the other hand, the user 3 who wants to request computation connects with the center system 2 via the wide area network 1, and requests computation to the center system 2 (Step 104). In this embodiment, since a computation unit price can be changed according to demand-and-supply balance about information processing ability so that it may mention later, in such a case, the user 3 is made to perform a request of computation, after checking the present computation unit price which the center system 2 presents. A calculation job to request processing from can be transmitted to the center system 2 from the user 3 with protocols, such as FTP (file transfer protocol), for example.

[0019]The center system 2 which received a request of computation, A series of processings (job) requested by the user 3 so that it may divide into two or more unit processings (unit-of-account block) in which parallel processing is possible (Step 105) and may be most suitable for execution of a series of processings, For example, so that a calculation result may be obtained in

shortest time by parallel processing in two or more donors 4, Assignment of a unit-of-account block to each donor 4 is determined (Step 106), and each unit-of-account block of assignment is distributed to each applicable donor 4 via the wide area network 1 (Step 107). Each donor 4 who received distribution of a unit-of-account block performs data processing of the unit-of-account block (Step 108), and transmits a calculation result to the center system 2 via the wide area network 1, respectively (Step 109).

[0020]The center system 2 adjusts the calculation result transmitted by each donor 4 (Step 110), and transmits to the user 3 as a processing result (Step 111). When the requested computation is a search problem which has a wide search range and each unit-of-account block divides the search range into a small block simply, Although it may be made to reply to the user 3 side as it is by making the search results (calculation result) for every block into a processing result, without performing adjustment of a special result, When the way of division the processing (job) in Step 105 is complicated, Since it becomes difficult to grasp the result which receives the processing requested only by the calculation result for every unit-of-account block, a calculation result is edited based on the way of division processing, etc., and it is made to transmit to the user 3 by making the edited calculation result into a processing result. For example, since it is difficult for a user to understand the result of original matrix operation even if it transmits the calculation result in each submatrix to the user 3 as it is when large-scale matrix operation is divided into a submatrix operation, as adjustment of a result, It is desirable to edit a result so that the result of original matrix operation may be known immediately.

[0021]Then, the center system 2 performs accounting. That is, based on the amount of execution processed by the computer 5 by the side of the user 4, by asking for the product of this amount of execution and unit price, the center system 2 calculates fee collection (Step 112), and asks the user 3 for a charge (Step 113). The user 3 pays a charge (Step 114) and the center system 2 makes payment of a charge to each user 4 according to the amount of execution for every user (Step 115).

[0022]An example of composition of the center system 2 which performs such processing is shown in drawing 3.

[0023]The center system 2 is provided with the following.

The supervisor control section 11 which unifies the whole center system 2.

The CPU price setting mechanism 12 in which a price of per unit count ability (CPU) is set up from demand-and-supply balance of the amount of offers information processing ability's by the donor 4, and the user's 3 request process amount of capacity 3.

The job dividing device 13 which divides computation (job) requested by the user 3 into two or more unit processings (unit job) of having been suitable for global computing.

The surplus throughput database 14 which accumulates information about the donor 4 or its computer 5, Based on information accumulated in the surplus throughput database 14, which unit processing should be assigned to the donor 4 (computer 5 of a throat) so that efficiency may become good most, for example, Processing distribution and surveillance 16 which distributes each unit processing to each donor's 4 computer 5, and collects results according to a quota result in the scheduler 15 to determine and the scheduler 15

Especially the supervisor control section 11 performs processing of the donor's 4 registration, registration of a processing request from the user 3, adjustment of a calculation result, transmission to the user 3 of a calculation result, accounting, etc. Processing distribution and the surveillance 16 also perform surveillance of network status with the donor 4 through the wide area network 1.

[0024]Hereafter, the CPU price setting mechanism 12, the job dividing device 13, the surplus throughput database 14, the scheduler 15, and processing distribution and surveillance 16 are explained in more detail.

[0025]The CPU price setting mechanism 12 is a mechanism for determining the price corresponding to demand-and-supply balance, as mentioned above, Since supply and demand may always change about each price at the time of purchasing the remaining power portion from the donor 4, and reselling to the user 3, the newest value is always computed as a unit count ability price (CPU price), and the donor 4 and the user 3 are shown.

[0026]A unit count ability price is explained here. While the information processing ability of the computer 5 which each donor 4 holds is of infinite variety and the information processing ability which can be provided as a remaining power portion also differs for every donor, it may change every moment. Since the data transfer rate between the center system 2 and the donor 4 in the wide area network 1, etc. may change, relative throughput also including a network throughput is calculated and it is considered as a unit count ability value here. Processing distribution and the surveillance 16 transmit a test program (probe) periodically to each computer 5, and each computer 5 processes this test program, and, specifically, transmits a processing result to the center system 2 (processing distribution and surveillance 16) so that it may mention later. The throughput of each computer 5 is calculated using the response time taken to have transmitted the test program to each computer 5 by the center system 2 side, and to receive the right answer to the test program. In that case, for example, the throughput of a standard personal computer established in the center system 2 is set to "1", and a relative throughput value is made into unit count ability. Measurement of the unit count ability for every computer 5 is performed periodically, and it is accumulated in the surplus throughput database 14 as the donor's 4 throughput time series data.

[0027]The CPU price setting mechanism 12 refers to the surplus throughput database 14, For example, a unit count ability unit price (CPU unit price) is set up so that the total of the unit count ability assumed to be required for the processing which was registered and was requested by the total and the user 3 of available unit count ability now may become equal according to the demand-and-supply curvilinear model on economics. That is, in the case of the total offer capability (supply) < total duty (demand), a CPU price is raised, and a CPU price is made to descend in the case of the total offer capability (supply) > total duty (demand). In this case, since demand and supply change according to the price which the user 3 and the donor 4 were shown, as for the CPU price setting mechanism 12, adjustment of a CPU price is performed for every fixed time. Thereby, the time series data of a CPU price are created.

[0028]When a CPU price which was mentioned above is adjusted, it is thought that a CPU price shows the action similar to a stock price. Therefore, when the excessive price fluctuation in a short time considers it as a not desirable thing, to be stabilized to some extent is able to provide restriction in the price volatility per time (range of fluctuation of a price), and to make price fluctuation. This corresponds to the price range limit in a stock market. Or a base price is set up by week unit or a month unit, and it may be made to fluctuate a price within the limits of predetermined according to supply and demand. Change a price by the time zone which provides information processing ability, or. Volume discount can be set up to doing (for example, it is made cheap at night) and a lot of calculation, or a user can make it possible to reserve desired information processing ability beforehand about the same daily time zone over a fixed period.

[0029]Anyway, in this embodiment, to the provided information processing ability, the

remuneration called for with x(processing time of track record) CPU price is paid to the donor 4, and suppose that a x(processing time of track record) CPU price + commission is charged to the user 3 who entrusted calculation.

[0030]Next, the job dividing device 13 is explained.

[0031]As mentioned above, the job dividing device 13 performs processing which divides the computation (job) requested by the user 3 into two or more unit processings (unit job) of having been suitable for global computing. The job dividing device 13 specifically divides the whole computation which the ** user 3 requested into minimum unit operation (the minimum batch that a merit does not occur economically even if it divides more), ** Divide the requested computation into two or more unit processings by classifying minimum unit operation into a time series procedure and a parallel procedure, unifying minimum unit operation of ** plurality, and dividing into the unit-of-account block used as the shortest total response time (time required by the reply of a result). A time series procedure is processing performed using the result of the processing to precede, and since a parallel procedure does not have a dependency between processings, it is the processing which can be performed in parallel here.

[0032]If there are many unit-of-account blocks when performing job division, the processing which communication and data transfer take will increase. Since the unit-of-account block in which parallel processing is possible can be simultaneously processed by two or more computers 5 of two or more donors 4, it can shorten total response time.

[0033]When these processings perform global computing, they are processing generally performed, and they can be carried out automatically. However, in order to raise the grade of parallel processing more and to aim at much more shortening of total response time, it is important that it is designed or the processing itself requested by the user 3 is coded so that it may be suitable for such parallel processing. The knowledge over a parallel programming is required of rewriting a certain processing in a form suitable for especially parallel processing, and it is also expected that it is beyond the common user's 3 hand.

[0034]Then, it is possible to accumulate beforehand calculation programs which are often likely to be used, such as various kinds of simulation programs and an optimization problem, on the center system 2 side, and to build a program library. In this case, the user 3 only transmits the parameter and data which are used by that calculation program while choosing the calculation program of the request in a library to the center system 2, The selected calculation program can be executed by the technique of global computing, and it is no longer afflicted by program rewriting for parallel processing, etc. Of course, each calculation program in a program library should be optimized by execution by global computing. Thus, another advantage which provides a program library, For the donor 4, it is not the calculation program that the strange user 3 created but the calculation program which the reliable center system 2 prepared, and I hear that the sense of reliability on security increases, and there is a program executed by self computer 5.

[0035]Next, the surplus throughput database 14 is explained.

[0036]The surplus throughput database 14 is a database which keeps information about the donor 4 who was going to provide a remaining power portion of information processing ability, and registered. Specifically in the surplus throughput database 14. About each donor 4, as ** donor information Information, including the donor's 4 contact, a payment procedure / track record, etc., ** Information about CPU (central processing unit)/OS in a computer resource which provides the donor 4 as resources information, Information, including a network protocol, handshaking, etc., used in order to connect with the donor's 4 computer 5 as information about an available time zone, a load priority, etc., and a ** initial entry, ** Logs, such as payment and a

report, are stored as a track record log as information, including a measurement result of throughput, a processing track record of a unit-of-account block, etc., and a ** report log.

[0037]Next, the scheduler 15 is explained.

[0038]Although processing requested by the user 3 is divided into two or more unit-of-account blocks by the job dividing device 13 as mentioned above, the scheduler 15 determines whether to assign and perform each unit-of-account block these-divided into the computer 5 of which donor 4 throat. In that case, based on information about donor information, resources information, and the present throughput which were stored in the surplus throughput database 14, the scheduler 15 assigns each donor 4 (each computer 5) each unit-of-account block so that a calculation result may be obtained most early. As a standard of assignment, not only a thing that a calculation result is obtained more early but a for example more highly precise result is obtained, or a thing that a result is obtained inexpensive (for Reasons of price setting according to time zone being made) may be adopted. Two or more standards of assignment are prepared beforehand, and one of those standards is chosen and it may be made to assign with the user's 3 request, character of computation, etc. based on a selected standard. A time zone which provides the donor 4 side with a remaining power portion of information processing ability may be specified, and, in such a case, a unit-of-account block is assigned in consideration of a specified time zone. The way of assignment in consideration of a time zone is also included under the category of a standard of assignment here. By making wide area network 1 the very thing into a global thing, It is also possible for it to be made to assign by choosing only the donor 4 who is always in night (time zone considered that the degree of margin of information processing ability is large) using time difference, and it becomes more possible by doing in this way a high speed and to process the user's 3 calculation more inexpensive.

[0039]When assigning a unit-of-account block, since the overhead relevant to a network in performing by the single donor 4, etc. are excluded, a series of time series processings are the most efficient, but. In order to prevent the donor 4 from guessing the contents and data of computation of the user 3 and to raise security, it is preferred to assign a unit-of-account block intentionally to two or more donors 4. In order to raise the security to the contents and data of computation also about the portion of parallel processing, it is preferred to divide and assign as many donors 4 as possible.

[0040]In this embodiment, assign one unit-of-account block to the one computer 5 of the user 4, and it generally transmits to that computer 5, When [that] the computer 5 completes processing of the assigned unit-of-account block, the following unit-of-account block is anew transmitted to the computer 5. Since the information processing ability which the donor 4 provides may be changed in that case, it opts for not all assignment of the unit-of-account blocks corresponding to the processing which the user 3 requested first, It is desirable to perform unit-of-account block assignment dynamically according to the present information processing ability etc. which are provided. That is, whenever one unit-of-account block is completed and it assigns the following unit-of-account block, it is desirable to look over again which donor 4 is assigned. The accuracy of calculation is required or assigning two or more donors 4 (or two or more computers 5) the same unit-of-account block is also considered to obtain a calculation result early anyhow.

[0041]The probe for calculating the donor's 4 (computer 5) present throughput shall also be periodically assigned to each donor 4 and each computer 5 as a unit-of-account block.

[0042]Next, processing distribution and the surveillance 16 are explained.

[0043]Based on the assignment which the scheduler 15 determined, the fundamental function of processing distribution and the surveillance 16, Via the wide area network 1, it distributes to the

computer 5 of the donor 4 who corresponds each unit-of-account block, and responses to the distributed unit-of-account block, such as a processing result and a calculation advancing situation, are received. When a response is received, processing distribution and the surveillance 16 notify the scheduler 15 that the response occurred while sending the response to the supervisor control section 11. When a response is not obtained by within a time [which was assumed] at this time, While regarding it to the communication line from which an obstacle occurred or constitutes the wide area network 1 to the donor's 4 computer 5 as what the obstacle generated and directing cancellation of calculation to it to the donor 4, It records that a response was not obtained on the surplus throughput database 14, "calculation failure" is returned to the scheduler 15, and the donor who distributes the same unit-of-account block to the scheduler 15 again is made to determine.

[0044]When the response to a probe has returned, processing distribution and the surveillance 16 record the throughput which judged and judged the donor's 4 (computer 5) throughput according to time until the response to a probe comes on the contrary etc. on the surplus throughput database 14. It is kept from the donor 4 side showing whether which is the unit-of-account block of a probe, and it is the actual unit-of-account block which requires which for the user 3. [it]

[0045]A unit-of-account block is explained here. Drawing 4 shows an example of the composition of a unit-of-account block. The certification information block 22 for the unit-of-account block 21 to attest the unit-of-account block itself, The data import block 23 which described the processing which imports the data used for calculation from the center system 2, It is constituted from this unit-of-account block by the processing block 24 which described the processing which should actually be performed, and the data export block 25 which described the processing which exports a calculation result to the center system 2 side. Thus, except for the certification information block 22, the unit-of-account block 21 comprises a executable code. If security is thought as important while it will be preferred to consider it as binary code, and it will not depend it on the architecture or OS of the computer 5 of the donor 4 but will enable execution of it, if a executable code gives priority to calculation speed, It is preferred to consider it as the code described by programming language JAVA (registered trademark) etc.

[0046]Next, the processing by the side of the donor's 4 computer 5 is explained.

[0047]As mentioned above, the donor 4 registered into the center system 2 downloads client software, for example from the website of the center system 2, and installs in self possession / computer 5 to manage. Drawing 5 is in the state where client software was installed in this way, and is a flow chart which shows processing by computer 5 when a unit-of-account block is sent to the donor's 4 computer 5 from the center system 2.

[0048]If a unit-of-account block is sent, the client software installed in the computer 5 will receive the unit-of-account block (Step 121), First, client software checks whether the unit-of-account block is really a thing from the center system 2 using the certification information block of a unit-of-account block for maintenance of security (Step 122). Then, client software imports data required for computation from the center system 2 based on a data import block (Step 123), and performs a series of processings based on a processing block (Step 124). If execution of a series of processings is completed, client software will export a calculation result to the center system 2 side based on a data export block (Step 125). Since the processing to the received unit-of-account block is completed by the above, client software deletes altogether the data received from the center system 2 in relation to the unit-of-account block and a unit-of-account block from the donor's 4 computer 5 (Step 126).

[0049]When the processing interruption command from the center system 2 is received, Client

software deletes altogether the data received from the center system 2 in relation to the unit-of-account block and a unit-of-account block from the donor's 4 computer 5 while ending processing at the time.

[0050]Although the above is processing by client software, it may be made for this client software to display further the information, including the throughput of resources, a CPU unit price, etc., which that computer 5 provides on the screen of the computer 5.

[0051]In this computer resource utilization system, the donor 4 does not need to guarantee about that excessive information processing ability or certainty of offer to provide, and can receive the remuneration calculated based on the CPU price in the time of providing with the track record for which the donor's 4 resources were used. Fundamentally, the resources provided for the donor's 4 enforcement of this computer resource utilizing method are the disk space of operating of CPU and the memory in the computer 5, a network, and some, and do not perform saving the data from the center system 2 to the donor's 4 environment.

[0052]Here, the hardware organization of the center system 2 in the computer resource utilization system explained above is explained. As shown in drawing 3 for every component of the supervisor control section 11, the CPU pricing mechanism 12, the job dividing device 13, the surplus throughput database 14, the scheduler 15, and processing distribution and surveillance 16. The center system 2 can be constituted by establishing the hardware mechanism corresponding to those components. However, generally the center system 2 is realizable also by making the computer program for realizing the function of each component mentioned above read into computers, such as a server computer, and performing the program. The program for realizing a center system is read into a computer by recording media, such as magnetic tape and CD-ROM. Drawing 6 is a block diagram showing the composition of the computer system used in order to realize the center system 2.

[0053]The hard disk drive 32 for this computer system to store the central processing unit (CPU) 31, and a program and data, The main memory 33, the input devices 34, such as a keyboard and a mouse, and the display devices 35, such as CRT, It comprises the reader 36 which reads the recording media 37, such as magnetic tape and CD-ROM, and the communication interface 38 for connecting with the wide area network 1, and these are mutually connected by the internal bus shown by the graphic display double line. This computer system equips the reader 36 with the recording medium 37 which stored the program for realizing the center system 2, When the central processing unit 31 executes the program which read the program from the recording medium 37, stored in the hard disk drive 32, and was stored in the hard disk drive 32, it comes to function as the center system 2 mentioned above.

[0054]The user's 4 computer 5 of basic constitution is the same as the computer system shown in drawing 6, although the kind of central processing unit (CPU), the capacity of a memory, etc. may be different. However, as mentioned above, since client software may be distributed via the wide area network 1, in such a case. What is necessary is making it just make the program (what is called an Internet browser program) etc. which can receive a program via a network read from recording media, such as CD-ROM.

[0055]Next, as a field from which a merit is obtained by applying the processing service (global computing service) by the processing by the computer resource utilizing method explained above, i.e., wide area network connection of computer capability, For example, the optimization problem etc. in which Image Processing Division, such as a large scale simulation which made ** vector operation the subject, and ** rendering, the risk analysis which needs the case study of ** large number, and ** seek area are very large are mentioned. In the computation of these

fields, since many parallel modes are included, compared with the case where the conventional computer is used, processing time can be substantially shortened by applying global computing service.

[0056]Even if many case studies use the program of an existing style as it is in a required risk analysis etc., the merit of global computing service can fully be obtained by performing the case study of different conditions by a concurrency.

[0057]Since global computing service is suitable for a series of processings which comprised two or more processings that mutual relevance was small, it is thought by changing the construction technique of a program that an applicable field increases further.

[0058]By having in stock a library program which was suitable for global computing by the center system side, while easing a user's burden, service which can receive a merit of global computing becomes effective.

[0059]

[Effect of the Invention]As explained above, this invention connects to a wide area in a network the computer generally used widely, While reduction of the outsourcing expense which starts Data Processing Division by providing the accounting procedure in connection with it while enabling it to open the margin part of the throughput to the others widely is attained, It is effective in becoming possible to raise the capacity factor of the information processing ability which each computer has.

[0060]Namely, as for what holds a computer, it becomes possible conventionally to use a remaining power portion effectively by [for which it is effectively used even if the throughput of the computer has a margin] selling the remaining power portion of throughput according to this invention, although it was not able to do. When processing which requires big information processing ability was performed conventionally, the very expensive special computer needed to be used, but it becomes possible by applying this invention to use big information processing ability by low cost. According to this invention, it becomes possible to use throughput at the appropriate cost (resale price) shown in real time.

[Translation done.]
CLAIMS

[Claim(s)]
[Claim 1]It is a computer resource utilizing method which utilizes information processing ability of two or more computers connected to a network, Receive a proposal of offer of a remaining power portion of information processing ability, and information about a computer corresponding to a proposal is registered into a database, Receive a request of computation from a user, divide requested computation into two or more unit processings in which parallel processing is possible, and said database is referred to, Unit processing which determined assignment and was assigned in said unit processing to said two or more computers is distributed to a corresponding computer, A computer resource utilizing method which receives a calculation result corresponding to distributed unit processing from said each computer, transmits a processing result to said user based on said calculation result, and performs accounting according to a calculation track record.

[Claim 2]A program for measuring throughput for every computer is distributed to said each

computer, The computer resource utilizing method according to claim 1 which receives a response to said program from said each computer, determines throughput for every computer based on said response, and stores determined throughput in a database.

[Claim 3]The computer resource utilizing method according to claim 1 or 2 to which a unit price used by accounting is changed so that a proposal of offer of a remaining power portion may be considered as supply and said demand and said supply may balance by making a request of computation into demand.

[Claim 4]A computer resource utilizing method given in Claims 1-3 any 1 clause which adjusts a calculation result from each computer according to a split method at the time of dividing requested computation into unit processing when transmitting a processing result to a user, and is made into said processing result.

[Claim 5]A computer resource utilizing method given in Claims 1-4 any 1 clause characterized by comprising the following distributed to each computer as a unit-of-account block.
A recognition information block in which unit processing includes recognition information.
A data import block which described processing for importing data required for execution of said unit processing from a center system.
A processing block which described substantive processing of said unit processing.
A data export block which described processing for exporting a result obtained by processing by said processing block to said center system.

[Claim 6]The computer resource utilizing method according to claim 1 or 2 which distributes software for receiving unit processing from a center system and performing this unit processing to those who did the proposal when a proposal of offer of a remaining power portion of information processing ability is received via a network.

[Claim 7]It is a computer resource utilizing method which utilizes a remaining power portion of information processing ability of a computer which self owns or manages, A computer resource utilizing method which performs a proposal of offer of said remaining power portion to a center system, receives unit processing from said center system, transmits a result which performed and was obtained by performing by said computer to said center system, and receives a charge according to a calculation track record.

[Claim 8]A database which stores information about a computer which is a computer resource utilization system which utilizes information processing ability of two or more computers connected to a network, and is going to provide remaining power of information processing ability, A job dividing part which divides computation into two or more unit processings in which parallel processing is possible, A scheduler which determines assignment of said unit processing to said two or more computers with reference to said database, Processing distribution and surveillance which distributes said unit processing to a computer corresponding, respectively via said network based on assignment which said scheduler determined, and collects calculation results from said computer, Receive a request of computation from a user and requested computation is passed to said job dividing device, A computer resource utilization system which has a supervisor control section which transmits a processing result to said user based on calculation results collected in said processing distribution and surveillance, and performs accounting according to a calculation track record.

[Claim 9]Said processing distribution and surveillance distribute a program for measuring throughput for every computer to said each computer, and receives a response to said program from said each computer, The computer resource utilization system according to claim 8 with

which throughput for every computer is determined based on said response, and determined throughput is stored in a database.

[Claim 10]The computer resource utilization system according to claim 8 or 9 which has further a CPU pricing mechanism in which consider a proposal of offer of a remaining power portion as supply, and a resale price of information processing ability of a computer is determined by making a request of computation into demand based on said demand and said supply.

[Claim 11]The computer resource utilization system according to claim 10 which a CPU pricing mechanism shows to those who try to perform a proposal of offer of a resale price which determined a resale price at any time and determined it based on demand and supply of a remaining power portion, and those who try to perform a request of computation.

[Claim 12]Are a recording medium which a computer system can read and a proposal of offer of a remaining power portion of information processing ability is received, Register information about a computer corresponding to a proposal into a database, receive a request of computation from a user, divide requested computation into two or more unit processings in which parallel processing is possible, and said database is referred to, Unit processing which determined assignment and was assigned in said unit processing to said two or more computers is distributed to a corresponding computer, A recording medium which stored a program which makes said computer system perform processing which receives a calculation result corresponding to distributed unit processing from said each computer, transmits a processing result to said user based on said calculation result, and performs accounting according to a calculation track record.

[Claim 13]Are a recording medium which a computer system can read and a unit-of-account block is received from a center system, Based on said unit-of-account block, perform computation, and After execution of said computation, A recording medium which stored a program which makes said computer system perform processing which deletes data received from said center system based on said unit-of-account block and said unit-of-account block from said computer system.

[Translation done.]